19.3.1 Grinding

Grinding is generally called as fine machining or finishing operations of removing materials from surface usually 0.25-0.50 mm in most operations through the use of grinding wheel. Grinding wheel is highly useful in removing extra unwanted metal and sharpening cutting tools such as chisels, drill, taps, and other cutting tools. It may be used to finish almost all surface, which has been previously roughly shaped by some other processes or to remove the extra material which is too hard to be removed by other machining processes. The accuracy in fine grinding is in few microns or even less. In grinding, the work is held pressed against the high speed rotating grinding wheel and the metal gets reduced by abrasion. Grinding wheel is generally made from silicon carbide or aluminium oxide. It is generally made up of particles of hard substance called the abrasive and is embedded in a matrix called the bond. These abrasives form the cutting points in a wheel and are termed as grains. The abrasives are of generally two types namely natural and artificial. Emery and corundum are two natural abrasives, while carborundum and aloxite are artificial abrasives. The hardness or softness of the wheel is dependent on the amount and kind of the bonding material. Generally, hard wheels of aloxite are used for grinding soft materials and soft wheels of carborundum for grinding hard materials using various types of grinding machines known as grinders. In wet grinding, large amount of coolant over the work and on wheel face is provided. Coolant will remove heat generated during grinding and promotes long wheel life and produces very good surface finish. The cutting face of a grinding wheel should be kept in a true, clean and sharp conditioned shape for obtaining efficient cutting. Suitable dressers are also employed periodically for reconditioning and dressing of glazed or blunt wheels. Grinder may be various types such as cylindrical grinder, surface grinder, pedestal grinder, tool and cutter grinder, centre-less grinder, internal grinder and jig grinder and profile grinder. Fig. 19.54 illustrates the surface grinding machine and principle of surface grinding. Fig. 19.55 illustrates the principle of cylindrical grinding.

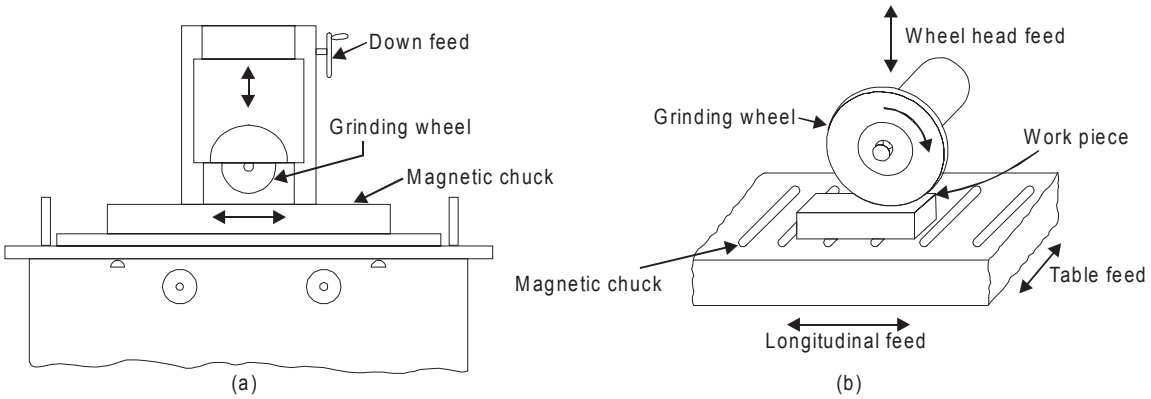

Fig. 19.54 Surface grinding machine and its principle

19.3.2 Polishing

Polishing is surfacing finishing process for producing a flat, scratch-free, mirror-like finish. It consists of fine grinding, intermediate grinding, rough polishing, and fine polishing. Initially the surface to be polished is roughly ground to remove deep cut off marks. Then the intermediate grinding is done with fine emery or silicon carbide (Carborundum) papers decreasing in grit size in three to four stages to remove grinding marks. Emery papers are

graded from fine to coarse. This polishing operation may be performed by hand or mechanically using the rotating disks. The motion in polishing of work on polishing wheel should always be straight and the polishing strokes should cover the whole length of the surface being polished. Finer grade emery disc pr polishing wheel should be used for the fine finish work. Polishing is commonly performed on utensils.

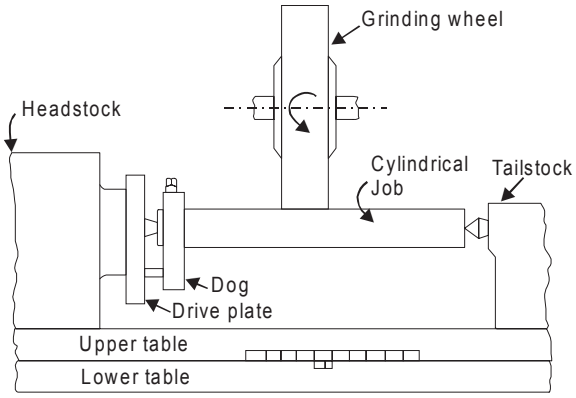

Fig. 19.55 Principle of cylindrical grinding

19.3.3 Surface Coating

The various manufacturing processes such as casting, forging, machining, hot working, cold working and joining processes etc. produce different surfaces. Therefore for getting desired surface of the part, subsequent surface preservation processes are needed. These preservation processes are called as surface coating of metals. Coatings on surfaces are employed on most metal parts, either for protective or for decorative or for both purposes. The main objectives of coatings involve for the purpose of decoration, surface protection, corrosion resistance and providing of a hard surface. The surface covering with coating must be uniform and free from runs, checks or peelings. Coatings are commonly applied to the finished components to form the final product. For successful coating, clean and smooth surface finishes is required for assuring good adhesion during coating. Cleaning operations are performed both preparatory to finishing operations and after finishing operations. They are primarily used to remove dirt, oil, oxides, scale, and other harmful ingredients that ultimately affect the life of the product. There are various methods of cleaning, drying, and competitive means of applying the coating. However, the various processes involved in preparing work for coating and applying the coatings are closely interrelated. Galvanizing, parkerizing, electroplating and painting are the common surface coating processes employed for protecting the surfaces of the work pieces.

19.4 QUESTIONS

1. How will you classify the tools commonly used in fitting ?
2. Explain briefly the various clamping tools used in fitting shop using neat sketches.
3. Explain in brief with neat sketches the various types of measuring tools used in fitting shop.
4. Explain the construction and working of vernier caliper using neat sketch. How its least count can be determined? What are its uses?

5. Explain the construction and working of micrometer with neat sketches. How its least count can be determined?
6. Explain in brief the various types of cutting tools used in fitting shop using neat sketches.
7. Explain in brief the various precautions associated with hand hacksaw, files and chisels.
8. Explain in brief the various types of striking tools used in fitting shop using neat sketches.
9. Explain the various types of files used in fitting shop. How are they classified ?
10. Explain the following tools.
    (*i*) Drill (*ii*) Reamer
    (*iii*) Taps (*iv*) Die and die stock
11. Write short notes on the following operations:
    (*i*) Marking (*ii*) Filing (*iii*) Chipping
    (*iv*) Sawing (*v*) Drilling (*vi*) Tapping
    (*vii*) Grinding (*viii*) Polishing (*ix*) Punching
12. What is the main difference between the hand hammers used in a smithy shop and a fitting shop?
13. What is the difference between hand hacksaw used in fitting shop and the saws used in carpentry shop?
14. Write short notes on the following:
    (*i*) Polishing (*ii*) Buffing (*iii*) Boring
    (*iv*) Milling (*v*) Broaching (*vi*) Shaping
    (*vii*) Grinding.
15. How will you achieve the following?
    (*i*) Rate of production (*ii*) Accuracy and
    (*iii*) Surface finish